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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

MINERAL REPORT

AN ASSESSMENT OF THE MINERAL POTENTIAL FOR TRANSFER OF CERTAIN FEDERAL LANDS UNDER THE RECREATION AND PUBLIC PURPOSES ACT, FOR THE CAMINO REAL DE TIERRA ADENTRO INTERNATIONAL HERITAGE CENTER; SOCORRO COUNTY, NEW MEXICO

(Title)

LANDS INVOLVED

SW¼SE¼ Section 24; Lots 5 & 6, Section 25, T. 8 S., R. 3 w., N.M.P.M. (Approx. 125 ac)

Prepared By:

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4/20/00
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Apr. 25, 00
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MINERAL REPORT

Proposed Camino Real Transfer/R&PP

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Introduction and Conclusions

This report describes the geology, past and present mineral activities, and assesses mineral potential for certain Federal lands to be transferred to the State of New Mexico under the Recreation and Public Purposes Act (R&PP). The R&PP would be for construction and management of the El Camino Real de Tierra Adentro International Heritage Center. The subject lands are located in Socorro County 35 miles south of Socorro, 40 miles north of Truth or Consequences, and 3½ miles east of Interstate 25, directly off an unimproved road (figs. 1, 2; these figures and all subsequent figures in this report are in the appendices).

For this report geologic research was done April 2000, and a field examination of the subject area was conducted April 10, 2000. Based on these it is my conclusion that the mineral resource potential of the subject land is low or less favorable/unknown, except sand, gravel, and other aggregate material which has high potential. However, these high potential resources are probably uneconomic to mine due to distance from communities. Similar deposits can be found around the subject area (NM State Hwy. Dept, 1979) and other areas in closer proximity to communities like Socorro. See below for detailed information.

My recommendation is to proceed in issuing the subject land R&PP lease. Issuance would not adversely affect mineral rights.

The conclusions and recommendations herein are limited exclusively to the proposed Federal land lease action prompting this report.

Lands Involved and Status Record Data

The legal description for the subject land is as follows: SW¼SE¼ Section 24, Lots 5 & 6, Section 25, T. 8 S., R. 3 W., NMPM, Socorro County, New Mexico, containing approximately 125 acres.

As of this report, the subject land is not encumbered by mining claims, mineral material sales, or mineral leases.

Physiography and Geology

The subject land under consideration for R&PP leasing lies in central New Mexico, south of Socorro (fig. 1). Major topographic features of the subject area include the Magdalena Mountains to the north, Fra Cristobal Mountains south, Jornada del Muerto east with the Rio Grande just east, and the San Mateo Mountains to the west (fig 3).

The lower portion of the Rio Grande Rift System structurally dominates the region of the subject area, and is part of the Basin and Range Province (fig. 4). The rift is composed of a

series of north-trending grabens which are en echelon in a north-northeasterly direction. The region is characterized by volcanic plateaus, dissected alluvial basins, and uplifted mountain ranges. Sedimentary, igneous, and metamorphic rocks ranging in age from Precambrian to Quaternary are regionally present. Some of these rocks and their associated structure record geologic history of the proposed subject land. Thus, a framework is provided in order to assess mineral potential.

Stratigraphy of the subject land is mainly Quaternary-Tertiary in age consisting of Santa Fe Group deposits and alluvial, bolson, terrace, and older pediment deposits which have been incised by drainages to the Rio Grande. The Santa Fe Group can vary vertically and laterally from a coarse conglomerate and gravel to sand, silt, and clay. Alluvium and pediment deposits overlie and obscure the Santa Fe in places. It is not always possible to differentiate pediments, alluvium, and other surficial deposits from the Santa Fe deposits due to erosion, interbedding, deformation, and transportation of detrital sediments. During the field inspection of the subject land, rock types observed from these deposits include consolidated and unconsolidated sand, silt, clay, silty sand and gravel, cobbles, volcanics, and limestones. Some of the volcanics may have been derived from Datil Formation rocks to the north and west (Dane, 1961). Limestones possibly came from the Madera and Sandia Formations to the west or from regional Pennsylvanian rocks (Dane, 1961). It is from this stratigraphy that any mineral potential exists in the subject area.

Mineral Potential of the Selected Land

Mineral potential is an assessment of favorability or probability that a mineral resource will occur in substantial enough concentrations to be exploited economically. A subjective classification of highly favorable, moderately favorable, and less favorable or unknown is utilized (Gray, 1987). This classification is analogous to high, moderate and low potential. High favorability exists in areas of known mines or prospects where geologic and economic data show an excellent probability that mineral deposits occur. This assessment also includes areas having production and/or identified resources with a total value of at least $1 million. An example is an area of active mining or exploration in a known mining district or mineralized area. Moderate favorability exists in areas where data indicates a good possibility that undiscovered deposits occur in formations known to contain economic minerals. This includes areas with selected submarginal resources, mineral occurrences, and productive areas or deposits. Low favorability exists in areas where available data imply the occurrence of mineralization, but indicates a low favorability. Less favorable or unknown areas includes areas where favorability has not been demonstrated. This designation does not imply the absence of minerals, only the lack of evidence of favorability.

For this report minerals will be treated as energy resources, metals, and industrial materials.

Energy Resources

Energy resources include coal, petroleum, uranium, and geothermal.

There are a number of principal mining districts in Socorro County, with most being located in mountainous areas, but none in the subject area (fig. 3; Lasky, 1932). Ore bodies present in these districts have produced little energy resources. Coal has been produced from the Carthage District, located northeast of the subject land (fig. 3). Also, there is potential for coal in the San Augustine Coal Area, but this is located west of the subject area in Catron and Cibola Counties (U.S.D.I., 1988).

There has been no petroleum production in the subject area to date. It has been anticipated that if any petroleum production occurs that it would be west of the subject area in the basinal areas of central Catron County.

There have been uranium occurrences in Socorro County but most, including a few near the subject area, have had no production (figs. 5, 6).

The Socorro Peak area, north of the subject area, has been designated a Known Geothermal Resource Area (KGRA). In other areas, including the subject area, no shallow high temperature resources (100°+ C) have been discovered (fig. 6). However, there are two thermal points located northwest of the subject area (fig. 6). These control points have a value of 2.32 and 3.30 heat flow units (10 cal/cm/sec). These values translate to average and high heat flow, respectively. High heat flow does not necessarily equate to high potential. These control points probably represent only local "hot spots", not a regional high geothermal gradient. Also, the control points area has not been designated a Known Geothermal Resource Area (KGRA) or Known Geothermal Resource Field (KGRF). Finally, without more detailed studies, including geophysical, fracture and faults, geochemical, geomagnetic, et al, it is unknown if an economic geothermal system exists here. For these reasons geothermal potential in the subject area is currently considered to be limited.

For reasons discussed above potential for energy resources in the subject area is considered low, or less favorable/unknown (Gray, 1989).

Metals

There are a number of principal mining districts in Socorro County which have produced metals (fig. 3). The primary metals

mined in these districts are gold, silver, copper, lead, zinc, beryllium, manganese, and iron. Only one of these primary metals, gold, occurs near the subject area, north, but this is a prospect with no recorded production. Other metals occur in Socorro County but none in or near the subject area (figs. 3, 6). Potential for metals in the subject area is low, or less favorable/unknown (Gray, 1989).

Industrial Materials

In Socorro County the population and industrial bases are relatively low, which can make many potentially economic minerals uneconomic on a place-value basis. Therefore, place value, the location of minerals relative to consumption areas, is important in the Camino Real area. Many agents influence mineral potential, e.g., haul distance, processing, price, customer preference, and location. Industrial minerals may be present in Socorro County and the Camino Real area but may not be an economic resource because of factors like user specification or no existing market.

Most mineral material in the subject area is from Quaternary-Tertiary alluvial and pediment deposits (see geology discussion section). Given the rock types and nature of these deposits, industrial materials present are mainly sand, gravel, and other aggregates. There is a recent mining claim northwest of the proposed area in W½NW¼SE¼ section 15, T. 8 S., R. 3 W. The claim is for high calcium limestone. However, during the field inspection of the proposed area only limestone cobbles mixed with other pediment and alluvial material was observed.

Sand, gravel, and aggregate material in the subject area is found mainly in Quaternary age alluvial, colluvial, landslide, pediment, and terrace deposits. Some has been transported to the area from outside formations and sources. There have been sand and gravel operations north and west of the subject area in Quaternary alluvial and pediment deposits. These deposits have been up to 13 ft thick and contain up to an estimated 600,000 cy of material (NM State Hwy. Dept., 1979). During the field examination an exposure cut in the proposed area contained a deposit about 25 ft thick.

Recently, seven soil test holes were drilled in the subject area to a depth of 5-31.5 ft (Geo-Test, Inc., 1998). Sample analysis results indicated the presence of silty sand, gravel and cobbles in all drill holes. Two of the holes contained clayey material in 5 feet of the sample interval.

In summary, almost all industrial materials have a low or less favorable/unknown potential in the proposed area. Sand, gravel, and other aggregate material has a high or highly favorable potential.

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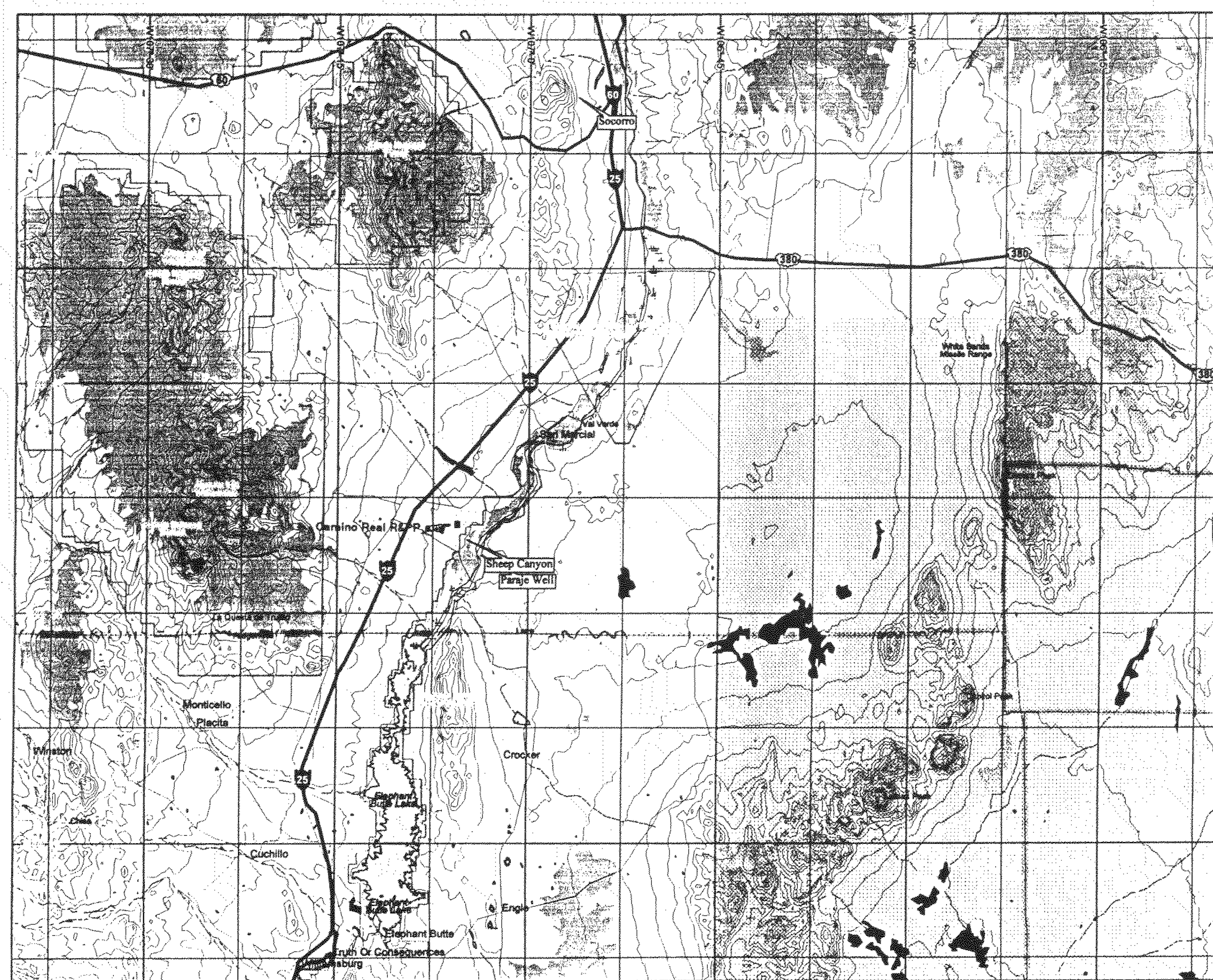
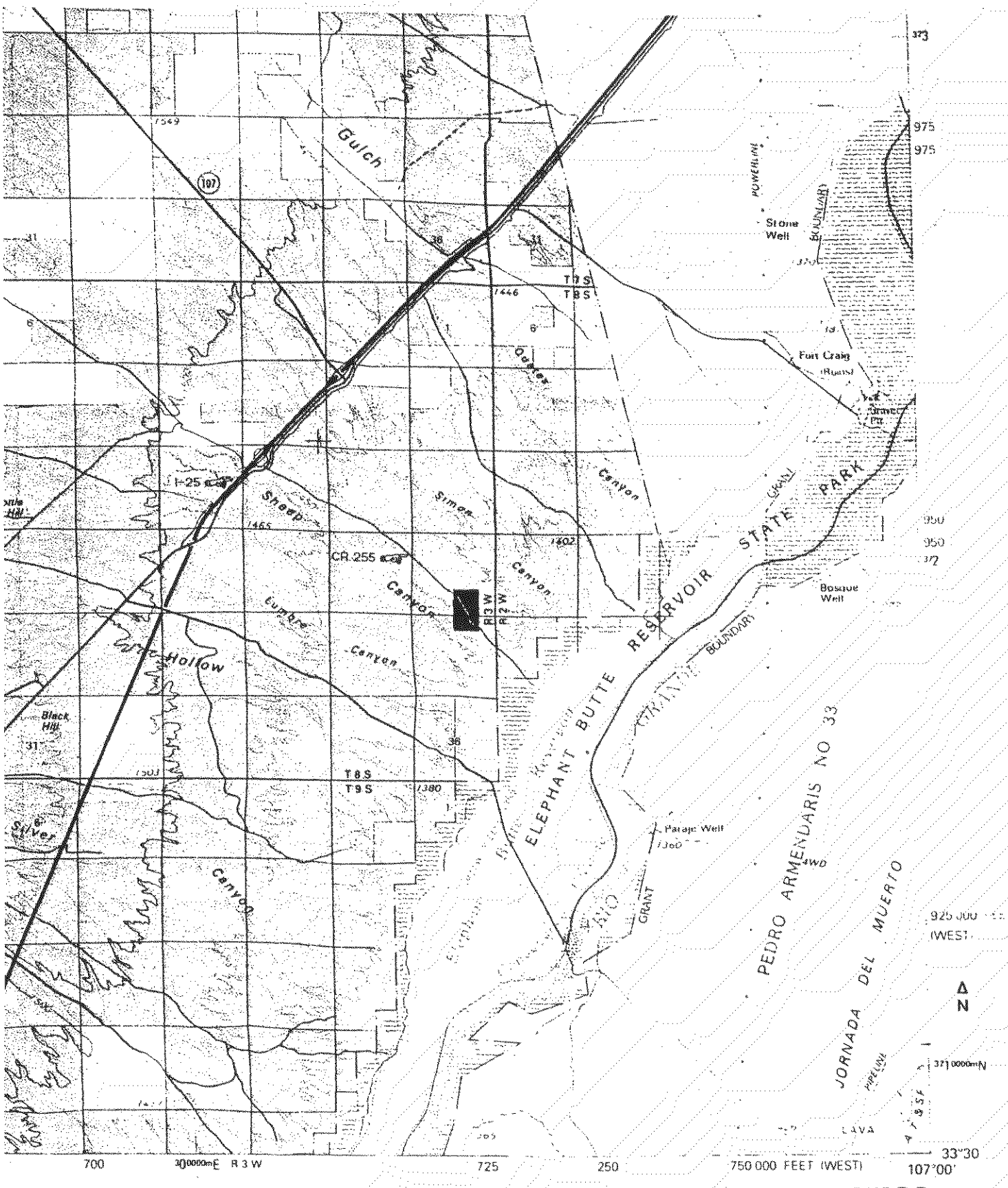


3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 |——| 4 mi Scale: 1 : 600,000 Detail: 8-4 Datum: WGS84

Figure 1

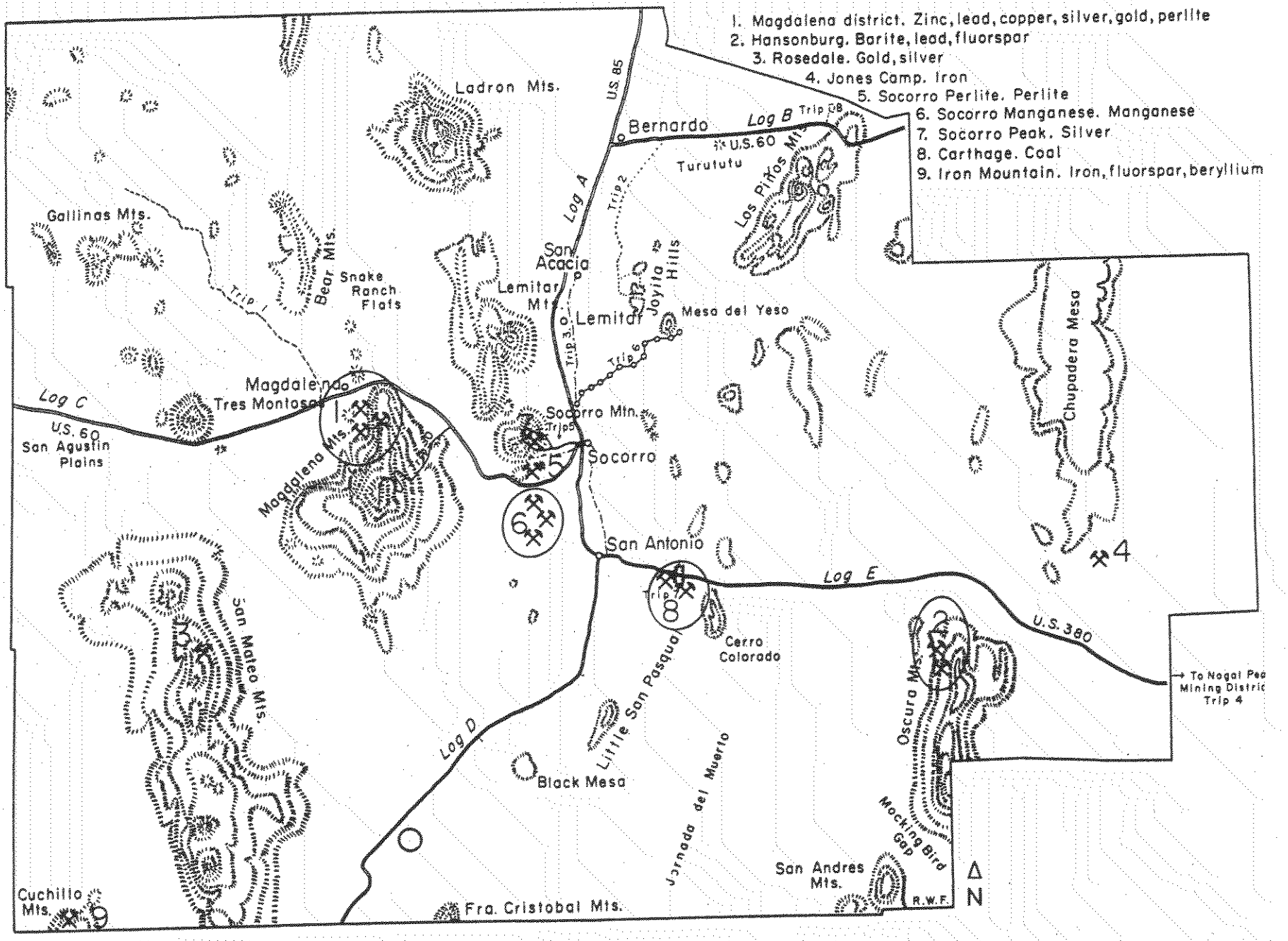


SAN MATEO MOUNTAINS, NEW MEXICO

N3330–W10700/30x60

Figure 2

Subject Area



Subject Area ○

Figure 3 Index map of principal mining districts of Socorro County.

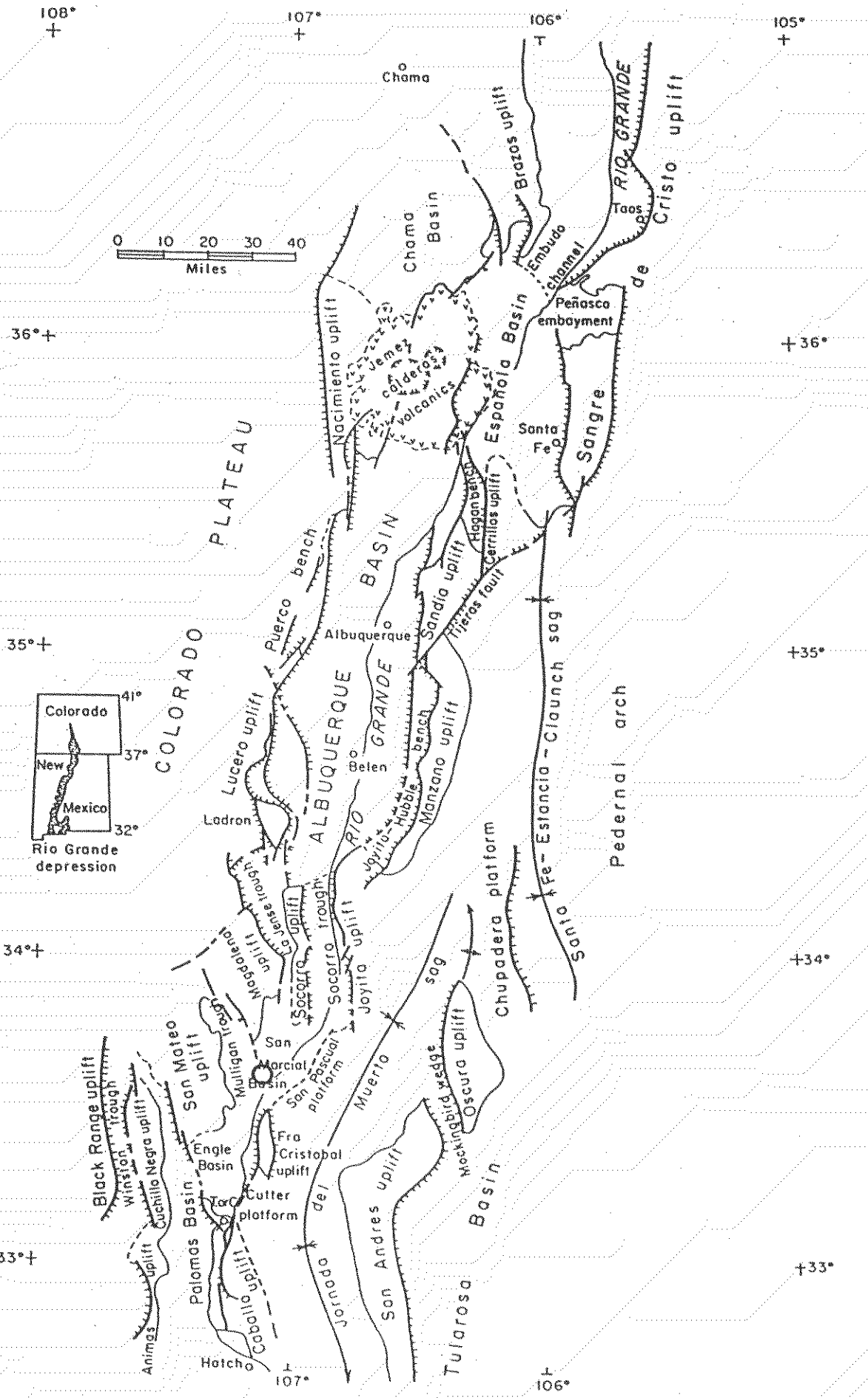
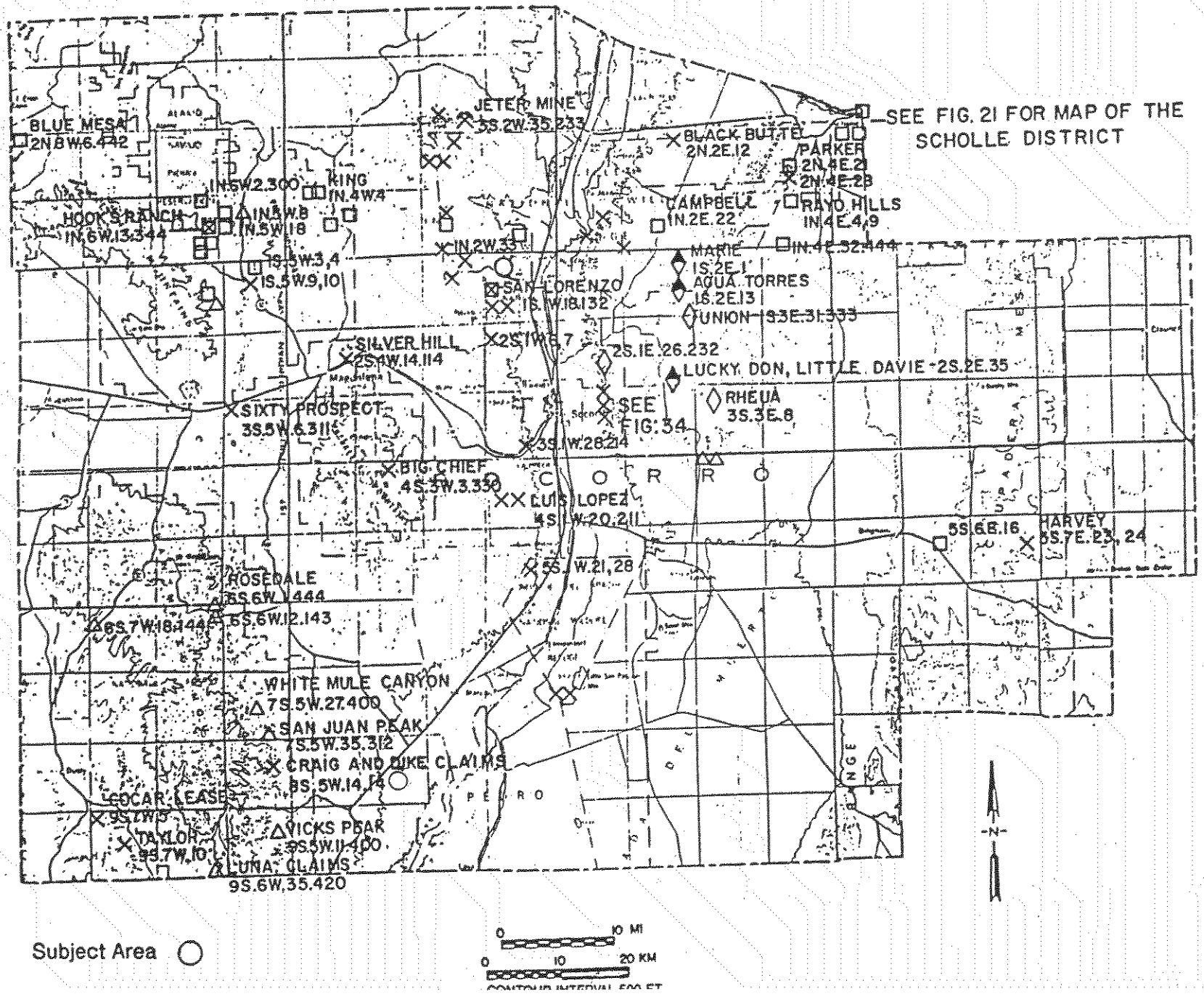


Figure 4 TECTONIC MAP OF RIO GRANDE RIFT SYSTEM IN NEW MEXICO.

Subject Area ○

N

FIGURE 5 RADIOACTIVE OCCURRENCES IN SOCORRO COUNTY, NEW MEXICO



CLASS / PRODUCTION CATEGORY	DEPOSITS IN IGNEOUS AND METAMORPHIC ROCKS	DEPOSITS IN VOLCANIC ROCKS	SANDSTONE DEPOSITS	DEPOSITS IN OTHER SEDIMENTARY ROCKS	DEPOSITS OF UNCERTAIN ORIGIN
OCCURRENCE, NO PRODUCTION	×	△	□	○	◇
UP TO 20,000 POUNDS U_3O_8	⚒	▲	⊠	◓	◈
20,000 - 200,000 POUNDS U_3O_8	⊗		◩	◑	◆
200,000 - 2 MILLION POUNDS U_3O_8			◪	●	
2 MILLION - 20 MILLION POUNDS U_3O_8			▣		
GREATER THAN 20 MILLION POUNDS U_3O_8			■		

TABLE I KEY TO SYMBOLS USED ON RADIOMETRIC OCCURRENCE LOCATION MAP

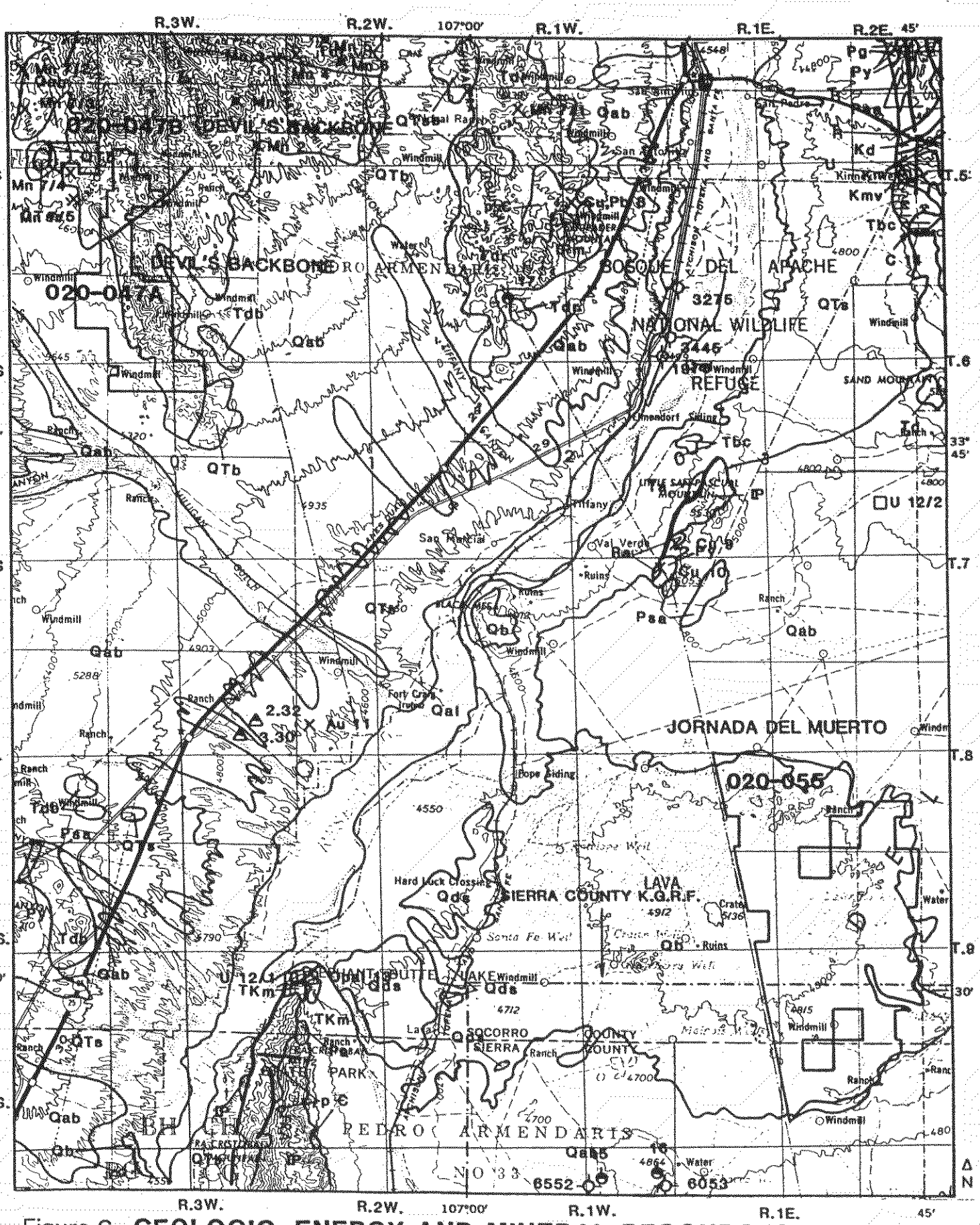


Figure 6 **GEOLOGIC, ENERGY AND MINERAL RESOURCES MAP OF THE ARMENDARIS AREA, NEW MEXICO**

Scale
1 : 250,000

Subject Area ◯

LEGEND: see table 2

Table 2 – Legend for Fig. 6

SPECIAL SYMBOLS

FOR ENERGY AND MINERAL RESOURCES

KNOWN DEPOSITS AND OCCURRENCES

- O – Oil field
- G – Gas field
- Os – Oil shale
- C – Coal deposit
- C – Coal occurrence
- Mineral orebody – as specified with symbol
- Mineral deposit – as specified with symbol
- Mineral occurrence – as specified with symbol
- Mineral district (Fig. = inserted map)

EXPLORATION AND/OR MINING ACTIVITY

MINERALS AND COAL

- Mineral deposit, mine or prospect with recorded prod.
- Prospect or mine with no recorded production
- Accessible adit, or tunnel
- Inaccessible adit, or tunnel
- Vertical shaft
- Inclined shaft
- Active open pit, or quarry
- Inactive open pit, or quarry
- Active gravel or clay (cl) pit
- Inactive gravel or clay (cl) pit
- Exploration hole with data available
- Exploration hole without data
- Mining district (Fig. = inserted map)

PETROLEUM

- Oil well
- Oil and gas well
- Gas well
- Show of gas
- Show of oil
- Show of oil and gas
- Shut-in well
- CO_2- or He-helium- rich well
- Dry well – abandoned

GROUND WATER

- Water well of special importance
- Water well of high yield
- Flowing water well
- Brine
- Mineral water
- Thermal water
- Radioactive water
- Thermal point

ENERGY RESOURCES

- O Oil
- G Gas
- Os Oil shale
- Ot Tar sands
- C Coal
- Cb Lignite (brown coal)
- Cp Peat
- U Uranium
- Th Thorium
- Gt Geothermal

Table 2 (cont'd)

MINERAL RESOURCES

METALS

Al Aluminum
Sb Antimony
As Arsenic
Be Beryllium
Bi Bismuth
Cd Cadmium
Cr Chromium
Cs Cesium
Co Cobalt
Cu Copper
Ga Gallium
Ge Germanium
Au Gold
Fe Iron
Pb Lead
Li Lithium
Mn Manganese
Hg Mercury
Mo Molybdenum
Ni Nickel
Nb Niobium or Columbium
Pt Platinum group
RE Rare earth
Re Rhenium
Sc Scandium
Ag Silver
Te Tellurium
Tl Thallium
Sn Tin
Ti Titanium
W Tungsten
V Vanadium
Zn Zinc
Zr Zirconium and Hf Hafnium

NONMETALS - INDUSTRIAL MINERALS

ab Abrasives
al Alum
as Asbestos
Ba Barite
be Bentonite
ca Calcite
cl Clay
Construction materials:
cs Crushed stone
la Lightweight aggregates, includ.:
pm Pumice and volcanic cinders
pe Perlite
ec Expanded clay, shale, slate
vm Vermiculite
sg Sand and gravel
cr Cement raw materials
bs Building stones
li Lime
di Diatomite
Nonmarine and marine evaporites and brines
pt Potash
ns Salt - mainly halite
gy Gypsum and anhydrite
nc Sodium carbonate or sulfate
bn Boron minerals
ni Nitrates
Sr Strontium
Br Bromine
cc Calcium chloride
mg Magnesium compounds
fs Feldspar
F Fluorite (fluorspar)
ge Gem stones
gr Graphite
He Helium
kl Kaolin
ky Kyanite and related minerals
ls Limestone
lm Lithium minerals
mg Magnesian refractories
mi Mica
ph Phosphate
pi Pigment and fillers
qz Quartz crystals
si Silica sand
S Sulfur
tc Talc
ze Zeolites
hm Humate

Table 2 (concl'd)

ADDITIONAL EXPLANATION

△ 2.32	Thermal control point, number is the value in heat flow units (10 Cal/cm /sec)
3275	Number indicates depth in feet
X Mn 7/1	Prospect's number corresponding in the text

SPECIAL GEOLOGICAL FEATURES

POINT OF SPECIAL GEOLOGIC INTEREST

m	Mineral occurrence	s	Structural, bedding, foliation, etc.,	u	Radioactive spring
f	Fossil locality	b	Brecciation, shear zone, etc.,	g	Thermal spring
v	Volcanic phenomenon	y	High yield spring	a	Extensive rock alteration
t	Stratigraphic sequence	p	Spring with mineral water	r	Lithologic type locality